ESSENTIAL FACTS ABOUT CANCER

A HANDBOOK FOR THE MEDICAL PROFESSION

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AMERICAN SOCIETY FOR THE CONTROL OF CANCER
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This handbook was prepared by a Special Committee of the American Society for the Control of Cancer consisting of Dr. R. B. Greenough, Director Harvard Cancer Commission, Boston, Mass.; Dr. James Ewing, Director of Cancer Research, Memorial Hospital, New York; and Dr. J. M. Wainwright, Chairman, Cancer Commission, Pennsylvania State Medical Society, Scranton, Pa.

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FOREWORD

In February, 1917, by vote of the National Council of the American Society for the Control of Cancer, a committee was appointed to prepare the manuscript of a handbook on cancer for circulation among the members of the medical profession of the United States. This was done as a part of the campaign which the Society had inaugurated for the collection and dissemination of facts in regard to cancer to the end that the mortality might be reduced by a wider knowledge of the disease.

The first manuscript was submitted to the Council of the Society at a meeting in April, 1917. The manuscript was then sent to a number of different members of the Council for the critical review of special sections. The criticisms and suggestions thus obtained were utilized in a subsequent revision of the manuscript, which was submitted to the Council at a meeting held on October 26, 1918, and with certain changes, accepted and ordered published with the endorsement of the Council and in the name of the Society.

The handbook is designed to provide, in a brief and readily accessible form, the important facts about cancer in general and its manifestations in the different situations where it most commonly occurs. A critical and sometimes controversial review of published statistics as to the end-results of operative treatment could not be included without enlarging greatly the

size and scope of the publication. It was decided, therefore, to present only in general terms the expectation of success attending the radical operative treatment of cancer in each of its different situations. It is believed that a conservative view has been taken of the situation, and that the statements made can be thoroughly substantiated by the published experience of the foremost surgeons of the country.

The first edition was published jointly by the American Society for the Control of Cancer and the Council on Health and Public Instruction of the American Medical Association in July, 1919. From that time to July, 1923, about 40,000 copies had been issued. In a few states, through the action of a department of health, a state medical society, or other agency, copies have been sent to every registered physician.

The book has now been revised to meet the increasing knowledge of cancer and its treatment, and is issued under a slightly modified title.

The manuscript has been revised by the original committee; submitted to the criticism of the Publications Committee and approved by the Executive Committee of the Society for publication.

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I

GENERAL CONSIDERATIONS

Publicity and Education

As a result of the campaign which has been conducted by the American Society for the Control of Cancer for the education and enlightenment of the public on the subject of cancer, a greater and more accurate knowledge of this disease is already evident, and many fallacious ideas have been corrected.

This has been the first and most necessary step in the Society's efforts to reduce the very great, and often unnecessary, mortality from this disease, for until the patient of his own accord seeks medical advice, no steps can, of course, be taken toward making a diagnosis or applying the proper treatment.

Much yet remains to be done in the way of the education of the public, not only in the more remote rural districts, but in the towns and cities as well. It must be done wisely and temperately, and without producing so great a fear of the disease as to alarm people unnecessarily.

It is the knowledge that the disease can be cured by radical treatment in its earliest stages that must be disseminated. Many laymen, and some physicians, find it hard to believe this.

Cancer is not a disease that runs its course, like pneumonia or typhoid; it is an actual

entity—as much a part of the individual as is his finger or his nose, and it will either remain a part of him and grow to a fatal termination, or it must be removed entirely in order that he may be cured.

The layman knows of the many cases that are not cured, whether an attempt at cure by operation has been made or not, but he rarely knows of the cured cases, for the reason that the individual who has been relieved of the disease by operation goes about his or her business as well as ever, and disguises so far as possible, the loss of the organ or the scar of the operation by which his or her life was saved. It is difficult to controvert this personal experience of the individual by assertions of the possibilities or probabilities of cure, but it must be done if the public is to understand the actual facts of the cancer problem. Every physician should feel it his duty to make these facts clear to the laymen within his reach.

Responsibility of Physicians

The physician of the present day must do far more than care for the cases of disease that call for his help. He is the health officer of his own clientele, and the members of it look to him for knowledge to protect them from disease. The instruction which has been given to the public is already bearing fruit, and from many communities come the reports that patients now present themselves to their physi-

cians much earlier than in the past, with symptoms that they consider suggestive of cancer. Under these circumstances it behooves members of the medical profession to consider the obligations which rest upon them as the nearest and the first sought source of scientific knowledge, to give to their patients that wise counsel which they have a right to expect.

It is a well known fact that a considerable proportion of malignant tumors are not recognized by the doctor when the patient presents the indefinite early symptoms of the disease. Optimism too often replaces a careful physical examination. For example, the great majority of cancers of the rectum are to-day treated as hemorrhoids for from one to six months. Uterine discharges are often not properly investigated, and curettings are not examined. Cancer of the tongue and mouth is permitted to advance because there is a positive Wassermann. Metastases are produced by repeated, rough examinations. Malignant moles and epitheliomas of the skin are imperfectly removed. Clearly inoperable cases are operated on, thus bringing operation into disrepute.

These facts call for a far keener appreciation of responsibility for the mortality from cancer than now generally exists in the medical profession.

Cancer Statistics

On the basis of all the available statistics, it is safe to place the annual mortality from

cancer in its various forms, for the Continental United States at 100,000. This is 25,000 more deaths than when the campaign for the control of cancer was initiated about ten years ago. Subject to slight fluctuations, the cancer death rate, in proportion to population, has shown a further and persistent tendency to increase. That increase is not apparent or attributable to improved methods of certification and classification, but is a real increase, due to conditions which are as yet but very imperfectly understood.

The increase is so much more significant when it is considered that operative results are now more successful than in former years. But as long as patients continue to come to operation in a practically inoperable condition, the present lamentable situation will not undergo material change. In other words, there are no reasons for questioning the statement that the liability to cancer is increasing faster than the mortality from the disease. This conclusion is accepted by practically all of the foremost authorities on the subject, throughout the world. Cancer cannot with our present knowledge be prevented and the only hope for measurably reducing its mortality, lies, therefore, in early diagnosis and qualified interference.

With a due regard to the organs and parts of the body affected, the annual mortality for 1923 may be estimated as follows:

ESTIMATE OF THE MORTALITY FROM CANCER IN THE UNITED STATES, 1923 *

Cause of death	Total	Number of deaths:	
		Male	Female
Cancer	100,000	42,603	57,397
Cancer of the buccal cavity	3,422	2,795	627
stomach, liver	37,191	19,461	17,730
peritoneum, intestines, rectum	13,967	6,165	7,802
female genital organs	14,659	.....	14,659
breast	9,198	117	9,081
skin	3,190	1,951	1,239
other or unspecified organs	18,373	12,114	6,259

* F. L. Hoffman.

The deplorable aspect of the cancer problem is still more precisely brought out by an analysis of the cancer mortality rate for our large cities. In the order of their importance, for the year 1922, the crude cancer death rates of some of the principal cities of the United States were as follows:

	Per 100,000
Albany, N. Y.	162.9
San Francisco, Cal.	161.8
Boston, Mass.	145.8
Sacramento, Cal.	141.7
Topeka, Kansas	137.4
Providence, R. I.	135.5
Springfield, Ill.	132.4
Los Angeles, Cal.	132.0
Spokane, Wash.	126.7
New Orleans, La.	125.4
Cincinnati, Ohio	120.7

In thirty-seven cities combined, with a population of 22,600,000 there were 23,502 deaths from cancer, equivalent to a rate of 104.1 per hundred thousand of population.

Of course, the rates for particular cities are, to a certain extent, affected by hospital admissions, providing special facilities for cancer

treatment, but there is no doubt that cancer is more frequent in large cities than in rural districts. Nor can it be questioned that cancer is more common among the well-to-do and the prosperous than among the poor. It is a disease which appears to afflict peculiarly those who are especially well nourished and in good general health. Likewise, it is primarily a disease of civilized peoples, for it is rarely found among our native races, particularly among our native Indians, who, in their native state, are practically free from it. The same conclusion applies to South American Indians. The disease is increasing rapidly among the so-called negro population of this country, which, of course, is now largely mixed with white elements.

But from whatever point of view considered, there is no question but that the disease has been increasing. America to-day has one of the highest cancer death rates of any part of the globe, and we are rapidly approaching a point where few countries will have higher rates than that for the United States.

Experimental Work

During the past twenty years commissions and laboratories for cancer investigation have been established in many places in the United States, as well as abroad. In these centers research work has been carried on on the tumors of animals as well as on human cancer. The resources of chemistry, physics, physi-

DEATHS FROM CANCER IN THE REGISTRATION AREA, 1921 *

Seat of disease	Number			Per cent		
	Total	Male	Female	Total	Male	Female
Cancer and other malignant tumors (aggregate)	76,274	32,495	43,779	100.00	42.60	57.40
Cancer of the buccal cavity (total)	2,610	2,132	478	3.42	2.80	0.63
Cancer of the Lip	432	383	49	0.57	0.50	0.06
Tongue	653	555	98	0.86	0.73	0.13
Mouth	245	194	51	0.32	0.25	0.07
Jaw	979	763	216	1.28	1.00	0.28
Others of this class	301	237	64	0.39	0.31	0.08
Cancer of the stomach and liver (total)	28,367	14,844	13,523	37.19	19.46	17.73
Cancer of the Pharynx	115	93	22	0.15	0.12	0.03
Esophagus	1,264	1,014	250	1.66	1.33	0.33
Stomach	18,213	10,262	7,951	23.88	13.45	10.42
Liver and gall bladder	8,775	3,475	5,300	11.50	4.56	6.95
Cancer of the peritoneum, intestines and rectum (total)	10,653	4,702	5,951	13.97	6.16	7.80
Cancer of the Mesentery and peritoneum	724	272	452	0.95	0.36	0.59
Intestines (except rectum)	6,834	2,890	3,944	8.96	3.79	5.17
Rectum and anus	3,029	1,514	1,515	3.97	1.98	1.99
Others of this class	66	26	40	0.09	0.03	0.05
Cancer of the female genital organs (total)	11,181	....	11,181	14.66	....	14.66
Cancer of the Ovary and fallopian tube	749	....	749	0.98	....	0.98
Uterus	10,085	....	10,085	13.22	....	13.22
Vagina and vulva	287	....	287	0.38	....	0.38
Others of this class	60	....	60	0.08	....	0.08
Cancer of the Breast	7,016	89	6,927	9.20	0.12	9.08
Cancer of the Skin	2,433	1,488	945	3.19	1.95	1.24
Cancer of other or unspecified organs (total)	14,014	9,240	4,774	18.37	12.11	6.26
Cancer of the Larynx	575	496	79	0.75	0.65	0.10
Lung and pleura	1,146	595	551	1.50	0.78	0.72
Pancreas	1,310	726	584	1.72	0.95	0.77
Kidneys and suprarenals	806	423	383	1.06	0.55	0.50
Prostate	1,672	1,672	....	2.19	2.19	....
Bladder	2,419	1,707	712	3.17	2.24	0.93
Brain	204	111	93	0.27	0.15	0.12
Bones (except Jaw)	825	419	406	1.08	0.55	0.53
Testes	155	155	....	0.20	0.20	....
Others of this class	4,902	2,936	1,966	6.43	3.85	2.58

Exclusive of Hawaii.

* These figures are for the "Registration Area," in which statistics are available, and represent for 1921 only 82.2% of the total population of the United States.

ology and biology, and the study of immunity reactions have been brought to bear upon the problem. The work is being carried on; but the ultimate cause of cancer is not yet known.

Many important facts have been discovered, and by every fact contributed, the growing structure of our knowledge of the disease is being built up. One of the results of this work is that we now know many things that cancer is *not,* and useless expenditure in investigation along those lines has ceased. We know that cancer is not due, in the sense that infectious diseases are due, to a parasite. We know that cancer is not communicated from one person to another, and that there is no danger of the nurse contracting the disease in caring for the cancer patient. We know that the influence of heredity in the incidence of the common forms of cancer in human beings is so remote that this factor may, as a rule, be disregarded. We know that one form of cancer after another has been shown to be related to some form of chronic irritation, as a direct or indirect contributing factor. We know that cancer of the cervix, the lip, the tongue, the rectum, the stomach, and many of the forms of malignant disease of the external skin—Marjolin's ulcer, the cancer associated with the wearing of the peculiar charcoal-heated Kangri basket of Kashmir, the paraffin worker's cancer, and the roentgen-ray worker's cancer—are all closely associated in their inception with some form of chronic and re-

peated irritation. The study of cancer in animals has gone far to support this idea of the origin of cancer, and the artificial production of cancer in the stomach of rats by feeding them with infested cock-roaches (Febiger), and the production of sarcoma of the liver in rats by infesting them with cysticercus (Wood) provide most striking proof of the relation of chronic irritation as a factor in the cause of cancer.

It has also been shown in the laboratory that the rough compression and manipulation of a cancer are capable of setting its cells free to form metastases. From this we learn to use the utmost gentleness in the palpation of a tumor for diagnosis, as well as to avoid compression, dragging, and all unnecessary trauma to cancer tissue during the operation for its removal. All of these facts we owe to the laboratory investigation of cancer. We may reasonably hope that the next decade will contribute as much or more information concerning this disease.

Improved Operative Technic

In the great surgical clinics the technical details of the operative treatment of cancer of the different organs are constantly under investigation with a view to improvement and to greater effectiveness. For most of the common sites of cancer the operative technic of the so-called radical operation is practically standardized.

The site of origin and the mode of dissemination of cancer in the different organs is well known. Each standard operation aims to remove the tissues of origin and the tissues suspected of secondary involvement, by a wide margin and *without cutting into cancer tissue or scattering it broadcast in the wound.*

There are problems still to be solved along these lines, especially in the simplification of the operation and in the reduction of the operative mortality and the possible complications, as in cancer of the tongue or cancer of the uterus. It is possible, however, to give a fair and guarded estimate of the comparative mortality, and of the prospect of success of the operative treatment of cancer in different organs.

A successful radical operation results in the cure of cancer. While it is everywhere admitted that no fixed limit of time exists at the expiration of which an individual patient may be said with certainty to be "cured" of the disease, yet it is a fact that the ordinary three-year period is sufficient for all practical purposes. While undoubtedly late recurrence may take place after the three-year period has elapsed, in a small number of cases, especially in certain forms of the disease, such as cancer of the breast and cancer of the stomach, in the vast majority of cases recurrence comes within this period, if at all. The radical operation may be considered practically, if not abso-

lutely, certain of success, if no signs of disease have developed within three years.

Radium, Roentgen Rays, and Cautery

Radium and Roentgen Rays.—The effects of roentgen rays and of the radiations of radium, and of other radioactive substances, on cancer tissue, have aroused great interest and there has been much experimental and clinical study of their action.

In general, it may be said that effects ranging all the way from retardation of growth to actual destruction of tumor tissue can be secured by radiation. Certain forms of cancer tissue appear to show a greater susceptibility to the action of these radiations than the normal tissues of the body; especially is this true in regard to lymphoma and lympho-sarcoma.

Cancer of the mucous membranes, which is accessible to the direct application of radium radiation, can often be destroyed by this treatment. When metastatic deposits of cancer are present in the lymph nodes, however, by extension from the point of origin in the mucous membranes, external radiation, alone, cannot be counted on to destroy the disease, and a permanent cure is not to be expected. Nevertheless, long continued retardation of growth may be obtained. In some cases actual cures have been reported when radium was employed by direct insertion in the tumor mass.

For these reasons, external radiation must

be regarded as a safe method of treatment only for superficial cancer of the skin of the non-metastasizing type, or for other forms of surface cancer which have been in existence so short a time that metastasis to the regional lymph nodes cannot possibly have already taken place. This period is, at best, an indefinite one; but we know that in certain locations, such as the tongue or lip, early metastasis is the rule, while in other situations this period may be more prolonged.

It is for these reasons that the accepted treatment of established cancer of the lip, tongue, breast and other organs which are prone to cancer of the early metastasizing type is considered by surgeons to be by radical operation, with removal of the regional lymph nodes. The use of radium for treatment of local lesions of this nature, unless accompanied by surgical removal of the suspected lymph nodes, is likely to be inadequate and is not justified by our present knowledge of the effects of radium on cancer tissue. The employment of X-rays or radium in preparation for operation, and after operation in prophylaxis against recurrence, has contributed greatly to increase the resources of the surgeon in dealing with cancer. These methods are more readily applicable in some situations than in others, and reference is made in the subsequent pages to the possible employment of radium therapy in cancer of the different portions of the body. For superficial, nonmetas-

tasizing cancer, however, and for many superficial skin lesions, such as keratosis senilis, or papillomata, which have a precancerous tendency, treatment by radium is to be preferred to operation.

In certain cases of extensive nonmetastasizing cancer, also, the combination of operative treatment and subsequent radiation is a recognized and valuable procedure, and in the treatment of inoperable and incurable cancer, roentgen rays and radium offer a field of the greatest usefulness. Under heavy radiation, a bleeding, ulcerated, offensive surface can often be cleaned up rapidly, even though the disease continues to infiltrate the tissues and the metastatic deposits increase until the patient dies. There is no question of the symptomatic relief and comfort afforded to the patient by palliative treatment with roentgen rays and radium.

Cautery.—A method of treatment of cancer which has a certain number of advocates is that of cauterization. For small, superficial lesions, the actual cautery has long been employed, with some success. When the cancer is entirely destroyed, the method is satisfactory, although the healing of the wound is prolonged and painful, and the scars produced are far more unsightly than after operation. A special adaptation of the cautery to uterine carcinoma has been advocated in the use of low heat and prolonged treatment. This method has, however, largely been displaced

by the use of radium which finds one of its greatest fields of usefulness in cancer of the uterus.

The cautery is helpful in many other forms of cancer: First, its use is strongly urged by a certain number of surgeons as the most effective method of sealing the lymphatics immediately after excision of a portion of a tumor for frozen section diagnosis. Second, the cautery excision of tumors of the mouth and jaw, where danger of surface contamination and implantation is to be feared, has come to be an established method of operation. Third, the cautery may be employed for the palliative treatment of inoperable, ulcerated and bleeding cancers, often in association with radium or the roentgen rays.

Serum Treatment

There have been innumerable attempts to produce a cure for cancer by drugs or tissue products, instead of through the mechanical destruction or removal of the tissue by radioactive agents, cauterization or surgical operation. None of these methods has withstood the critical test of time—the serum of supposedly resistant or cured human cases; the serum of animals subjected to inoculations of human cancer tissue; the injection of human cancer emulsions as a vaccine, or of bacterial toxins. Each method has been given fair scientific trial and has been found to be of insufficient value to warrant its use.

"Cancer Cures"

Drugs of all kinds have been employed both for local administration by injection or as caustic pastes and for more general constitutional effects. In some the active agent is known as creosote; in others the remedy is secret. The compounds are sold at high prices to physicians or to laymen who are sufficiently credulous to purchase them. No series of authentic cures of cancer has yet been demonstrated by any of these methods.

Attempts to cure cancer, or to influence its growth, by diet have been widely advocated but with no success. When we realize the widespread occurrence of cancer in the animal kingdom, affecting herbivorous as well as carnivorous animals, of the most varied diet, we see how futile is the attempt to prevent or to cure cancer by any modification of diet in man.

Perhaps the most ridiculous of all of the fake cancer cures is that which depends on a theory of electrical vibration supposed to exist in human tissues. No scientific evidence of the existence of such vibration can be shown, but a whole system of diagnosis and treatment of disease has been constructed which reaps a rich harvest for certain practitioners, while giving imaginary relief only to the imaginary diseases which are diagnosed by its own peculiar methods.

Finally, the fake "cancer cures," herb and Indian doctors, increase the mortality from

cancer. It is charitable to suppose that those who exploit these methods do so rather from ignorance than by intention; but the result is the same in any case. The patient is encouraged to expect relief, until his money is exhausted and his disease is too far advanced for cure by any known method of treatment.

II

EARLY DIAGNOSIS AND TREATMENT

The early diagnosis of cancer is recognized to be the procedure of greatest value in the control of the disease, and it is consequently well to consider all of the conditions on which this early diagnosis depends.

Cancer in the different organs and regions of the body presents such variety that the symptoms must be considered not as manifestations of one disease, but of many.

In most situations the dictum holds true that *the more certain the diagnosis the less the probability of cure.* In one organ, as the breast, for instance, the earliest symptom of cancer may be either a tumor, discovered by accident, or an indrawing of the nipple or a puckering of the skin. In another, as the tongue, the first symptom noted by the patient is an ulceration which shows no tendency to heal. In other portions of the body, like the uterus or the rectum, the first symptom to attract the notice of the patient, or the physician, may be a discharge of blood from an internal, ulcerated surface.

In all of these situations conditions other

than cancer may give rise to symptoms like those of cancer. In other words, the symptoms of early cancer are not distinctive and should only serve to arouse suspicion of the presence of that disease. When the abdominal viscera are affected by cancer, the symptoms are still less definite and the early diagnosis is even more difficult. In these regions, however, examination by the roentgen ray gives us a means of early diagnosis which is not to be neglected.

Waiting Policy Dangerous

When symptoms are present which are suggestive of cancer but insufficient to warrant a positive diagnosis, two courses are open to the physician: The first is to wait until more distinctive symptoms develop; the second is to proceed at once to an exploratory operation. The first method, that of waiting until a positive diagnosis can be made, is, unfortunately, the one that has been most commonly practiced. It is the easy way. It is one of the factors most directly responsible for the present great mortality of this disease. During the period of waiting for positive and unmistakable symptoms, the disease frequently progresses from the curable to the incurable stage.

Exploratory Operations

Diagnosis by exploratory operation is the method which promises the greatest and most immediate reduction of the mortality from

cancer. The exploratory operation must be adapted to the region or organ affected by the disease, and it must be emphasized that a procedure which is suitable in one situation may be extremely dangerous in another. The desirability of an early exploratory operation, therefore, varies with the situation of the cancer.

Biopsy

The operative removal of tissue for pathologic examination (biopsy) is a measure open to discussion. Where a positive diagnosis can be made without this aid, the best and safest treatment is, undoubtedly, to proceed at once to radical operation. To cut into cancer tissue *in situ,* undoubtedly adds to the danger of disseminating the disease.

In certain regions, however, the radical operation for cancer involves such a great operative risk and such serious mutilation that it cannot with justice to either the patient or physician be advised on the basis of anything but a positive diagnosis. In this class fall especially cancer of the larynx, cancer of the tongue and jaw, and osteogenic sarcoma of the long bones. Under these conditions, especially if the tumor is an ulcerated one, the removal of a superficial fragment for immediate frozen section diagnosis is held to be permissible, although no delay should be tolerated, and the radical operation, if indicated, should be completed under the same anesthesia. Many surgeons believe that in such an exploratory

operation the wound in the suspected cancer tissue should be immediately and thoroughly cauterized to prevent the operative implantation of living cancer cells during the subsequent stages of the operation.

The safest procedure to be followed in doubtful or suspected cases of cancer in each organ or situation is discussed in the subsequent sections of this handbook. It is sufficient here to urge on the practicing physician the dangers of delay, and the advantages to the patient of an early, positive diagnosis.

Pain

The absence of pain as a symptom of early cancer is sufficiently important to justify special attention. There is nothing to cause pain in the early stages of cancer. The tumor develops insidiously, exerting little pressure on the surrounding tissues, and until the sensory nerves of the part are pressed upon, no pain is appreciated by the patient to draw attention to the fact. It has been said that if cancer in its early stages only caused as much pain as a toothache, the patient would come earlier to seek relief, and the mortality would be greatly diminished. The physician must recognize these facts, and so instruct his patients that they will appreciate that absence of pain gives no assurance that a given tumor is nonmalignant. Pain is not a factor in the early diagnosis of cancer.

Early Operation Generally Offers the Best Prospect of Cure

It is the well established opinion of the best medical authorities that at the present day early and thorough operative removal of the primary tumor offers the most certain cure for cancer.

Other methods of treatment are of value in certain cases; but in order to obtain a sure and complete cure of the disease, the original focus must be eradicated, together with all of the tissues which are known in each region to be the ones earliest invaded by an extension of the disease.

When the disease can be recognized in its early stages, and this thorough and complete operation promptly performed, the patient should, theoretically, be cured of cancer with almost as great certainty as a cure can be obtained in a case of appendicitis. Twenty years ago the early signs of appendicitis were little known. Cases came late into the hands of the surgeon, and the mortality was enormous in comparison to that of the present day, when the public and the physician both recognize the importance of early operation. It is surely not too much to hope that a similar reduction in the mortality of many of the more favorable forms of cancer will take place when the imperative need of early, competent treatment for the disease is more generally recognized.

Conditions Essential to Early Operation

1. *The Patient.*—The first essential in procuring prompt treatment of cancer cases is that the lay public should be educated to understand, as they now understand of appendicitis, the need of early operation and the importance of the early recognition of the disease.

We live in a period of publicity, and medical matters are coming to be recognized as one of the subjects in which greater public knowledge works for the common good. The American Society for the Control of Cancer has done a great deal by circulars, public lectures, and by local and state committees, to promote this work. City and state boards of health and individual health officers in many districts have contributed the help of their official positions to this work, and the daily press and the magazines have given their assistance to it.

A better knowledge of the disease is already evident in those districts where this publicity work has been carried on, but much remains to be done, and there are many people who can be reached only with difficulty who must rely for instruction on the only health officer with whom they come in contact—the family physician. It is on him that the duty finally rests to inform, to correct misapprehensions and obsolete ideas, and to teach his people the early and significant symptoms of the disease. Nothing can be accomplished in the individual

case until the patient is sufficiently alarmed, by symptoms he has been taught to regard as suspicious, to consult his physician for examination and advice.

2. *The Physician.*—It might well be supposed that as soon as the patient consulted his physician his disease would be recognized and early and adequate treatment at once applied. Unfortunately this is not always the case. Most of the physicians of this country have been taught in their medical schools and their text-books of surgery the distinctive and typical symptoms of cancer. But, by the extent to which they are typical, they are the symptoms of cancer which is no longer early but has already progressed to the inoperable stage. It is the early and uncertain cases that must be recognized, if a material reduction in the mortality is to be brought about.

3. *Examination.*—It would seem unnecessary to lay stress on so elementary a method as actual physical examination as an aid to diagnosis, were it not for the fact that the neglect of a physical examination by the physician too often robs the patient of his or her chance to obtain a cure. Sometimes the examination is abandoned or delayed in the mistaken object of saving the patient's sensibilities. Sometimes it is neglected because the physician is not alert to the possibly grave significance of the patient's symptoms. In any case, it may fairly be said at the present day that the physician *who fails, by a physical*

examination, to make sure that the symptoms complained of are NOT due to cancer fails to give his patient the chance of cure to which he is entitled. Especially is this true in cases of cancer of the breast, of the uterus, and of the rectum, where the early diagnosis depends entirely on physical examination.

4. *Diagnosis.*—If cancer is to be detected in its early stages, its earliest symptoms must be well known to the physician, and a large number of doubtful cases must be taken care of where positive symptoms are lacking but a strong suspicion of cancer exists.

How are such cases to be handled? On the one hand the physician does not wish to let himself get the reputation of being an alarmist, and drive his patients to unnecessary operation on a mistaken diagnosis. On the other hand, he cannot, for the sake of the patient, wait for the more certain symptoms to develop, and for the disease in the meantime to become incurable. It is the physician's reputation against his patient's life. There can be only one answer—the life of the patient is the only consideration. Under these circumstances the physician deserves the aid and the sympathy of the community.

The public must be taught that the physician who is alert to recognize and procure operative treatment in the early stages of the disease will undoubtedly at times cause patients the expense of an unnecessary surgical consultation —an expense that most persons will gladly

bear if they can be assured that they are not afflicted with this terrible disease.

It is the early cases that offer the difficult problems, and deserve the service of the very best experience.

And, finally, there are very few regions of the body in which, in a doubtful case, with the laboratory facilities of a modern hospital, an exploratory operation cannot be performed to procure an immediate positive diagnosis by frozen section examination of the suspected tissues. The physician who is alive to his responsibilities in the early diagnosis of cancer and who brings his patient to operation during the early and uncertain stages of the disease, renders the greatest service to his community, and deserves that this fact be recognized.

5. *Consent of Patient to Operation.*— Granting that the patient seeks early advice and that the physician recognizes the early symptoms and advises immediate operative treatment, the consent of the patient to this operation must be obtained. In the experience of the older members of the community, and they are the ones most concerned in the cancer problem, one after another of their friends and acquaintances have died of cancer, and many of them of a recurrence after an operation. Is it to be wondered at that they have little faith in the surgical treatment of the disease? They do not know that during the last twenty-five years the operations for cancer of different organs have been standardized, the patients

have been operated on earlier, and the numbers of cures have been materially increased. They do not even know of the cured patients with whom they come in daily contact, for the patients do not tell, and the scars of operation are rarely visible. These are some of the facts about the disease which must be established with the laity. Such facts are given in this booklet, and may be used with confidence by any physician who wishes a fair statement of the situation.

III

"PRECANCEROUS" CONDITIONS

A FACTOR which, during the last ten years, has proved to be of great importance in the causation of cancer, is chronic irritation. As the various theories of the parasitic origin of cancer have been disproved, chronic irritation has been found increasingly to be an important factor in the incidence of cancer in one region after another.

Discovery of the part which irritation plays has made it possible to give prophylactic treatment for the purpose of preventing the occurrence of cancer; a procedure which is as rational as the prophylactic use of antitoxins in many of the infectious diseases and, in fact, is perhaps a more effective life-saving measure.

The treatment consists in the removal by a minor operation, often under local anesthesia, of lesions such as keratoses, moles, fissures, chronic ulcerations and indurations, and the benign tumors, which so often precede the development of cancer itself.

Prophylaxis further demands the avoidance of sources of chronic irritation, such, for instance, as the removal of an ill-fitting tooth plate which causes irritation of the gum, or the repair, at as early a date as possible, of the

deeper lacerations of the cervix which usually occur at childbirth.

The more important lesions which may be regarded as of precancerous significance may be enumerated as follows:

1. *Pigmented moles* have long been recognized to be the starting point of that most fatal form of malignant disease, the so-called melanotic sarcoma.[1] Not all moles, of course, undergo the transformation, but all must be held to contain that inherent possibility. On the slightest sign of increase in size, irritation or induration, they should be widely removed by radical operation. Pigmented moles on the hands and feet are especially liable to repeated trauma, and thus to malignant change. A very dark color, a warty growth of the surface, and the active growth of hairs, are important indications for removal. About the nails of the toes and in other situations malignant moles may fail to show any appreciable pigment and for this reason their nature is not recognized.

2. The *senile keratoses,* or scaling patches of heaped up squamous epithelium, so common on the face and other exposed parts of old persons, are among the most common starting points for cancer of the skin.

Similar lesions occurring in younger persons as a result of irritants such as arsenic, coal-tar products or the late effects of radiation, are

[1]Melanotic sarcoma is believed by some good authorities to be in reality a form of epithelial tumor—i.e., carcinoma.

liable to a similar malignant change. They should receive prompt treatment and continued observation in order that the disease may be eradicated in its early stages.

3. *Chronic ulcers and fissures of the skin,* due to old burns and scars, the effects of roentgen rays and radium, tuberculosis of the skin, and old syphilitic lesions often give rise to cancer. To this category belongs the "Kangri" cancer of Kashmir (squamous cell carcinoma of the abdominal wall), occurring at the site of chronic ulceration due to burning from the Kangri basket, or hot stove carried against the abdominal skin within the clothing of the natives.

4. *Gallstones* are accompanied by chronic irritation of the gallbladder, and in a certain percentage of cases carcinoma of the gallbladder occurs.

5. A certain proportion of *ulcers of the stomach* are known to become the site of cancer of that organ, and a history which can be interpreted as evidence of previous ulcer is obtainable in certain cases of gastric cancer.

6. *Erosions and lacerations of the cervix* of the uterus, the almost inevitable result of childbirth, are the most common factors which predispose to cancer of the cervix. While it is customary for the physician to repair immediately the more serious lacerations of the cervix, less extensive lesions can be detected only at a later period after involution has occurred.

The routine examination of all women for cervical lesions three months after labor has been advocated, that these lesions may be immediately repaired, and this contributory cause of cancer avoided.

It is advisable that all women who have borne children, as they approach the menopause, should have a vaginal examination and an inspection of the cervix at reasonable intervals until the menopause is well established, and the normal atrophic changes have taken place. Deep lacerations should be repaired. Superficial lesions, if resistant to local treatment, afford a sufficient indication for amputation of the cervix. The hyperplastic endometritis, which accompanies fibromyoma of the uterus, is also believed to be one of the most important predisposing causes of cancer of the fundus.

7. Chronic *cystitis,* of one form or another, often precedes cancer of the bladder. The irritation caused by Bilharzia parasites or of specific chemical irritants, such as anilin, produces changes in the bladder mucosa which may go on to carcinoma.

8. *Carcinoma of the buccal mucous membranes*—the lip, tongue, cheek and jaw—has long been thought to be associated with one or another source of *chronic irritation.* In this country the most common source of chronic irritation of the buccal mucous membranes lies in the use of tobacco. It is significant, also, that in certain other countries cancer of the buccal mucous membranes appears to arise

most directly as the consequence of the chewing of irritants, such as the buyo leaf or the betel nut.

Syphilis is a predisposing factor in cancer of the mouth. The chronic hyperplastic condition of the buccal mucous membrane—leukoplakia—has repeatedly been observed to progress into carcinoma while under treatment. The irritation produced by ill-fitting tooth plates, or the chronic irritation of pyrorrhea alveolaris are occasionally forerunners of cancer of the alveolar processes.

9. *Kraurosis and leukoplakia of the vulva* are forms of superficial lesions, benign in origin, which exhibit a definite tendency to malignant change. Suitable treatment, and close and continued observation to detect the early signs of developing cancer, are necessary, in order that radical treatment may be instituted during the early stages when the disease can thus be cured.

10. *Involution changes* of a physiologic nature appear to predispose to cancer in certain organs, notably the female breast, and the male prostate. In the breast the involution phenomena which give rise to the condition commonly known as chronic cystic mastitis, show an incidence of carcinoma estimated at from 10 to 25 per cent. In the prostate, chronic prostatitis and hypertrophy precede the symptoms of carcinoma in a notable proportion of all cases.

11. *Many tumors which are essentially be-*

nign in character are capable of malignant transformation, especially in the later years of life. These include papillomas, adenomas of the thyroid and of the intestines, villous tumors of the bladder, papillary and cystic tumors of the ovary and of the breast, polyps of the uterus or the rectum, and, in fact, all tumors in which the epithelial elements preponderate.

In all of the foregoing conditions, the possibility, if not the probability, of cancerous transformation is a serious element in prognosis. There can be no question that the cure or the removal of all such lesions is a vital indication.

Removal of predisposing factors in the production of cancer, and the early recognition of cancer when it is present, are the two measures which give promise at the present time of yielding the greatest results in reducing the mortality of the disease.

IV

CARCINOMA OF DIFFERENT ORGANS

1. Carcinoma of the Skin

This is a common form of cancer. It is found chiefly among persons of advanced age, and on the exposed parts of the body, especially in those who have long followed outdoor occupations.

It is slow growing, usually only locally invasive and malignant, and rarely produces remote metastases.

There are two main types: (1) those arising from the differentiated squamous cells, and (2) those originating from the less differentiated basal cells of the epithelium and reproducing themselves in the form of gland ducts or hair matrix cells. The squamous cell type is more likely to show extension to the lymphatic glands in the neighborhood; but not, as a rule, until late in the course of the disease.

Carcinoma of the external skin is especially liable to occur as a secondary change in preexisting fissures, keratoses, and chronic ulcerations and indurations.

Symptoms.—The development of a tumor involving the skin, or of a chronic ulceration covered with a crust and presenting an indurated base and periphery, is suggestive of carcinoma and demands investigation. Espe-

cially is this true when the lesion has been traumatized or subjected to chronic irritation.

Differential Diagnosis.—Differential diagnosis requires that syphilis, tuberculosis, and some of the rarer forms of skin diseases be considered. In doubtful cases the operative excision of the whole lesion, with a wide margin, and the pathologic investigation of the tissue, is the safest course.

Precancerous Lesions.—Warts, keratoses and chronic ulcers, when possible, should be excised or destroyed before they have an opportunity to undergo secondary malignant changes. This can usually be done by a very minor operation, often with local anesthesia. Many of the more superficial lesions of this nature can safely be destroyed by radium, roentgen rays or even caustic applications, but the clean surgical excision is frequently the safest method.

Standard Operative Treatment.—The standard operative treatment is total excision, with a considerable margin of healthy tissue. Where extension to neighboring lymphatic nodes is thought to have occurred, dissection of the affected territory, with removal of the diseased nodes and those immediately beyond them, in one mass, should be performed.

Superficial carcinoma of the face, especially in the region of the eyelids, may be subjected to treatment with roentgen rays or radium, in order that deforming scars may be avoided.

Skin cancer of the basal cell type does not

produce metastases but extends locally, involving the skin to a much wider area than would at first be suspected. For that reason its treatment by radium is especially successful. Treatment by radiation in such cases offers the prospect of a soft and less conspicuous scar. The same may be said in regard to the treatment of very superficial lesions with the curet and caustic agents. But any application of such methods, especially freezing or electrolysis, which does not insure the destruction of every malignant cell, is inadequate.

Results.—There is little statistical information covering cases of this character. On account of the relative infrequency or retardation of metastatic extension, cure by early, complete excision should be obtainable in every case of non-metastasizing carcinoma of the skin. It is a fact, however, that an incomplete excision is often done in the effort to remove no more tissue than absolutely necessary, whereas a wide margin is essential to a successful operation. In the few cases which produce metastases, the block dissection of the regional lymph nodes, together with the operative excision of the tumor, should yield a very large percentage of cures in early cases.

2. Carcinoma of the Lip

This is one of the more common forms of squamous cell cancer, especially in men. It has been attributed to chronic irritation such as is caused by the use of tobacco in any form,

but especially in pipe smoking. It produces metastases in submental or submaxillary lymph nodes, after a brief period estimated at two or three months, but less early than in carcinoma of the tongue and jaw.

Symptoms.—Carcinoma of the lip generally occurs as an indurated chronic ulcer, or non-ulcerated thickening on the free border of the lip. It occasionally appears as a warty growth.

Differential Diagnosis.—Primary syphilis (chancre) is rare. Syphilitic fissures are more common, and may accompany cancer. A positive Wassermann does not prove that cancer is *not* present, and delay for a therapeutic test is not advisable.

Precancerous Lesions.—Chronic ulcers and scabs (keratoses) are to be regarded as precancerous conditions, and should be removed by excision, or, in suitable cases, by the use of radium. In doubtful cases, operative removal is to be preferred in order that a pathologic examination of the tissue may be made, and the radical dissection of the regional nodes performed, if a frankly malignant tumor is disclosed.

Standard Operative Treatment. — (1) Doubtful cases: Excise the tumor or, if necessary, a small fragment for biopsy, and, if the microscope shows carcinoma, follow immediately with a dissection and removal of the lymph nodes of the submental region and of the submaxillary region on the affected side.

If the tumor is near the middle line, both

submaxillary regions should be dissected. The whole of the submaxillary salivary gland must be removed.

(2) If diagnosis is certain, excision by broad margin and dissection of lymph nodes, as above, is indicated.

Radium and X-rays.—The use of radium and X-rays for the treatment of early cases of cancer of the lip has been advocated in certain clinics. Radium, effectively offered, as it can be in the large clinics, is capable of destroying the local lesion, but the treatment of metastatic lymph nodes by external radiation is not to be depended upon for cure. The general policy of the best *surgical* clinics places the radical operation as the best treatment, and reserves radium for early precancerous lesions, for use as a palliative measure in advanced cases, and as a supplement to operation.

Results.—Cancer of the lip recognized and operated upon in its early stages at the time when the lymph nodes are not yet involved, yields a high percentage of radical cures. The more extensive the glandular involvement, the smaller is the prospect of success with operative treatment. Many cases are allowed to become inoperable by neglect of the regional neck dissection at the primary operation.

3. Carcinoma of the Tongue, Mouth and Jaw

These growths are not rare, and are one of the most malignant of the accessible forms of

carcinoma. They are of the squamous cell type, producing early metastases to the submental, submaxillary, parotid, and carotid nodes, and spreading rapidly by local invasion into the adjacent tissues of the floor of the mouth and across to the other side of the tongue, mouth and neck. The influence of tobacco as a form of chronic irritation is held to be of serious importance in the origin of cancer in this locality.

Symptoms.—This type of carcinoma begins as an indurated ulcer, or thickening of the mucous membrane of the tongue or mouth, or on the alveolar border of the gum. Any such ulcer of two weeks' duration should be regarded with suspicion.

Differential Diagnosis.—Chronic inflammatory conditions, such as ulcers due to jagged teeth, ill-fitting tooth plates, pyrorrhea, etc., may be predisposing causes. Late syphilis is often followed by carcinoma and a positive Wassermann does not exclude carcinoma. Leukoplakia, or superficial milky glossitis, is also a predisposing cause. Tuberculosis has typical, punched out and undermined ulcers, and is generally secondary to other tuberculosis. Actinomycosis of the jaw is rare; moreover, it is suppurative, and does not extend to the lymph nodes.

Precancerous Lesions.—To avoid delay, doubtful cases are best handled by the excision of the whole lesion for microscopic diagnosis, with cauterization to seal the lymphatics. In

operable cases the removal of a single lymph node from the neck for diagnosis should be avoided, as such an incomplete operation almost invariably leads to local implantation, if cancer is present in the node.

Standard Operative Treatment.—Standard operative treatment demands removal of practically the whole tongue, together with the floor of the mouth, and block dissection of all lymphatic tissues of one or both sides of the neck, usually including the jugular vein and the greater part of the sternomastoid—a very serious operation. If the jaw is divided, or removed, as is necessary in many cases, the operative mortality is estimated to be 25 to 30 per cent, owing to pneumonia or mediastinal sepsis. The operation can be done in two stages (Whitehead, Crile) with less mortality, but, also, with slightly less prospect of cure on account of the danger of local implantation.

Cautery Operations.—The severity of the standard radical operation above described, is such that only the most favorable cases can reasonably be subjected to it. A method of removal of the local disease by cautery excision, followed, if necessary, by radium implantation and subsequently by a second-stage neck dissection has been employed in certain clinics with reasonable success. In such cases the jaw is not divided, although the cheek may be split, to gain access to the tongue, and subsequently sutured.

Radium.—The destruction of the local lesion

in cancer of the tongue may be accomplished by insertion of radium and in certain clinics this method of treatment is advocated even in early cases. As in cases of cancer of the lip, control of metastatic cancer of lymph nodes by external radiation is not to be depended upon. A surgical neck dissection, combined if necessary with radium insertion, is to be preferred in any but inoperable cases.

Results.—Only moderately good results are claimed for operation in the larger clinics. In cases that are recognized early, and where the patient's constitution is such as to withstand the severe operation, a higher probability of cure may be expected. In advanced cases the chances of cure by operation are extremely slight. A long-standing control of the disease may be secured by a judicious employment of the various types of radiation.

4. Carcinoma of the Larynx

This is not an unusual form of carcinoma. It affects males more than females, and generally occurs in the later decades of life.

Carcinoma of the larynx occurs most often in two regions: (*a*) in the region of the vocal cords, and (*b*) in the upper part of the larynx.

Symptoms.—Hoarseness and loss of voice are the characteristic symptoms. Later, dysphagia and pain may appear, and when persisting beyond a reasonable length of time, demand investigation with the laryngoscope.

The growth may assume one of several forms.

It sometimes appears as a localized hyperemia, sometimes as a distinct growth, and sometimes as a deep-seated infiltration, later becoming ulcerated, and surrounded by hyperemia and edema. Extension to the regional lymph nodes generally occurs late in tumors of the larynx; it appears later when the tumor is in the region of the vocal cords than when in the upper parts.

Differential Diagnosis.—Carcinoma of the larynx must be differentiated from benign tumors (papilloma, fibroma, etc.) of the larynx, and from syphilitic, tuberculous and other ulcerations. Removal of tissue for pathologic examination (biopsy) may be practised, if immediately followed by the radical operation in case the examination shows that cancer is present. It should be avoided if the diagnosis can be made otherwise with reasonable certainty.

Standard Operative Treatment.—Thyrotomy, with removal of not only the diseased tissue, but also of all adjacent tissues, has given successful results in early cases, especially in cancer of the vocal cords. As a rule, total laryngectomy, with wide dissection of the regional nodes, is the operation of choice. The operative mortality is considerable, due to infection of the air passages. The mutilation is often serious, but is preferable to the otherwise certain, fatal issue. Palliative tracheotomy and gastrotomy may be done, and radium and roentgen rays may prolong life and relieve

pain for a limited period. The application of radium before and after the removal of the larynx has given good results.

Results.—Early, partial, and later, total operations, have yielded many successful results; but the prognosis in any but early cases is very grave.

5. Carcinoma of the Thyroid

This is one of the less common forms of cancer. It is likely to occur as a late change in thyroid tumors of long duration which have been considered to be benign in character. Several types are recognized. The tendency to remote metastases in the lung, and especially in the long bones and skull, is to be borne in mind, even in tumors in which the histologic picture shows only adenomatous tissue (malignant adenoma).

Symptoms.—The symptoms are those of an irregular, nodular tumor of the thyroid, which shows early fixation by adherence to surrounding structures, involvement of the recurrent laryngeal nerve, and extension to regional (jugular) lymph nodes.

Differential Diagnosis.—Typical cases are recognized only by symptoms of irregular induration, fixation, nerve involvement, dysphagia and dyspnea, and these indicate an incurable condition. Early cases are recognized only as tumors of the thyroid of unknown nature. These are a sufficient indication, after

the age of 35, to demand radical operative treatment.

Precancerous Lesions.—Any rapidly growing, thyroid tumor in an individual of 35 or over should be looked on with suspicion.

Standard Operative Treatment. — The standard treatment for carcinoma of the thyroid, is radical thyroidectomy to the extent of total removal of the whole gland and of the adjacent lymph-bearing tissues on both sides of the neck. Thyroid extract may be administered to prevent myxedema, and parathyroidin has been recommended to prevent tetany, from removal of the parathyroids.

Results.—Favorable results are obtained only in early cases before the capsule is invaded and while the diagnosis is most uncertain. Prophylactic treatment by removal of benign tumors is the most effective measure.

6. Carcinoma of the Esophagus

This is a squamous cell and metastasizing carcinoma. It is rare and possibly related to chronic irritation. There are an equal number of cases among males and females.

Symptoms.—The first symptoms are usually dysphagia followed by progressive extension to the local lymphatics in the neck or mediastinum, local invasion of the trachea, or perforation into the pleura. The patient suffers gradual starvation.

Differential Diagnosis.—This type of car-

cinoma must be differentiated from benign strictures and pouches by esophagoscopy, bougies, and roentgen rays.

Doubtful Cases.—These must be diagnosed by esophagoscopy.

Standard Operative Treatment.—Radical operation is still in the experimental stage. Palliative operations—gastrostomy, jejunostomy—may be performed, or radium applications may be used. But they must be done only with the greatest care and by those accustomed to oesophagal manipulation, on account of the danger of perforation.

Results.—These cases are practically always fatal.

7. Carcinoma of the Stomach

Carcinoma of the stomach is one of the most common manifestations of the disease. It is the most common form of cancer in males, and is only exceeded in frequency in females by cancer of the uterus and of the breast combined.

Symptoms.—The symptoms of cancer of the stomach are insidious. The patient appreciates only a progressive disturbance of gastric digestion, with loss of weight, and increasing gastric distress and bloody vomitus. These symptoms sometimes follow the symptoms of long-standing gastric ulcer—pain, hyperacidity, and the appearance of blood in the vomitus, or in the stools.

Differential Diagnosis.—The differential

diagnosis of any but advanced cases can be made only with the aid of laboratory analyses of the gastric contents, and the use of the roentgen ray. Any case of obscure gastric symptoms demands careful clinical and X-ray study without delay. The early recognition of this disease is extremely difficult with our present resources of clinical diagnosis.

Standard Operative Treatment. — The standard operative treatment of cancer of the stomach is by excision of the affected portion of the stomach with the adjacent lymph nodes. Only a small proportion of the cases submitted to operation are sufficiently early to permit an attempt at radical cure.

Results.—By a judicious selection of cases suitable for radical treatment, the operative mortality has been much reduced. In cases which are thus favorable for operation, a large percentage of cures is claimed in certain clinics. In general practice, however, the percentage is very much lower. Where the disease has developed to the extent of producing characteristic symptoms, the outlook is distinctly unfavorable.

8. Carcinoma of the Colon

This is one of the common forms of cancer in elderly persons.

Symptoms.—The symptoms are insidious—vague, intestinal indigestion and discomfort and loss of weight, in the early stages. The symptoms become more pronounced as the

tumor produces intestinal obstruction, with distension, colicky pains, and blood in the stools. As a last stage the intestinal obstruction, which was chronic and partial in the beginning, may become complete and thus acute, with fecal vomiting, distension and severe toxemia.

Extension to the regional lymph nodes, to the liver and to the peritoneum occurs, but the disease is apt to remain localized for a considerable period and thus often permits successful radical operative treatment.

Differential Diagnosis.—This requires that the causes of benign obstruction—scars, ulcers, the pressure of benign tumors outside of the intestine, inflammatory conditions, diverticulitis or appendicitis and the various forms of acute intestinal obstruction should be eliminated. This can be done only by exploratory operation.

The use of roentgen rays is of assistance in the more chronic cases, and the examination with the proctoscope is of value in the upper rectum and sigmoid cases.

Doubtful Cases.—An exploratory laparotomy, with an intestinal anastomosis or a colostomy, followed later by removal of the affected bowel, is the procedure to be advised.

Standard Operative Treatment. — The standard operative technic consists of removal, by a wide margin, of the affected bowel and its adjacent lymph nodes. If the disease is already in the liver, radical treatment is not to be attempted. In advanced cases, palliative

treatment by establishing anastomosis is of great relief to the patient.

Results.—On account of the difficulty of early diagnosis, few cases are suitable for an attempt at radical treatment. As patients present themselves at a general hospital, the prospect of cure is distinctly unfavorable, although successful cases are obtained from time to time.

9. Carcinoma of the Pancreas, Gallbladder and Liver

(*a*) Pancreas.—Carcinoma of the pancreas is rare.

Symptoms.—These are chronic, progressive, painless jaundice, accompanied by loss of weight, disturbance of digestion, and fatty stools. The gallbladder is usually distended.

Differential Diagnosis.—This calls for the elimination of other causes of obstruction of the common bileduct, such as that due to gallstones, or lymph nodes (lymphoma), or cancer in the region of the common duct and chronic pancreatitis.

Doubtful Cases.—Exploratory operation is indicated, but radical cure of cancer of the pancreas has not been accomplished.

Standard Operative Treatment.—Palliative operations, by establishing an anastomosis between the gallbladder and the duodenum, or small or large intestine, give temporary relief to one of the most distressing symptoms—jaundice.

Results.—Patients may be relieved of distressing symptoms by palliative operations, but radical cure of the disease has not been claimed.

(*b*) GALLBLADDER.—Carcinoma of the gallbladder is rare.

Symptoms.—The symptoms are indefinite. There is usually a history of gallstone attacks of long duration.

Differential Diagnosis.—The differential diagnosis is between cancer of the liver or stomach and gallstone disease. This is rarely determined except by operation.

Doubtful Cases.—It is a well established fact that cancer of the gallbladder is to be feared in cases of long standing gallstone disease. This is one of the reasons for the fact that in cases of gallstones, removal of the gallbladder is becoming the operation of choice.

Standard Operative Treatment.—When cancer of the gallbladder is evident, and its extension to the liver has not occurred, removal of the gallbladder is the standard operation.

Results.—A certain number of cases of cure of cancer of the gallbladder have been reported. The disease extends very rapidly, however, to the liver, and when this has occurred a cure is not to be expected.

(*c*) LIVER.—Cancer of the liver is very common as a secondary manifestation of cancer anywhere in the intestinal tract, and in some cases of cancer of other organs, such as the breast or prostate, melanotic sarcoma and

other forms of sarcoma. Primary cancer of the liver is extremely rare, and so are other primary malignant tumors of the liver, such as hypernephroma.

Differential Diagnosis.—This depends, as a rule, on the recognition of a possible primary focus of cancer elsewhere.

Standard Operative Treatment.—There is no operative treatment.

10. Carcinoma of the Rectum

This is a common form of cancer and one which may occur, not only in those of middle and advanced age, but in younger persons, also.

Symptoms. — Discomfort, feeling of inability to empty rectum, tenesmus, bloody stools, and, finally, intestinal obstruction, are symptoms of carcinoma of the rectum.

Differential Diagnosis. — Colitis, syphilis, tuberculosis and extensive chronic inflammatory processes with fistulae, must be considered. Digital and proctoscopic examination is *imperative.*

Doubtful Cases.—Benign polyps of the rectum and chronic inflammatory conditions must be regarded as predisposing to cancer of the rectum and should receive appropriate treatment. Many cases of cancer of the rectum are not recognized in their early stages because the physician neglects to insist on a digital or proctoscopic examination.

Excision of fragments of tumor tissue for pathologic examination is in general to be condemned, but may occasionally be necessary for diagnosis and should be made at the time of operation.

Standard Operative Treatment.—This consists in the removal of the whole rectum and the pelvic lymphatic tissue on account of the disposition of the disease to spread in the coats of the intestine as well as to the lymph nodes. This is usually done by a two-stage operation —a primary colostomy, with examination of the liver and of the pelvic lymph nodes; and the secondary removal of the tumor and a wide margin of the adjacent rectum and pelvic colon by the posterior route or by the combined abdominoperineal route, in one or in two stages.

Results.—In early cases successful results from radical operation may be expected. There is an inevitable operative risk on account of the severity of the operation; but when the constitutional condition is good and the disease has not had time to become too far advanced, a reasonable percentage of cases should be successful. As a palliative measure it diminishes greatly the distressing symptoms of the disease.

Radium Treatment.—The radical cure of cancer of the rectum by treatment with radium has been advocated in certain clinics, but the wide extension of the disease in the pelvic lymph nodes and along the coats of the bowel, makes its radical destruction by radiation ex-

tremely unlikely. Radium and X-ray treatment are now generally reserved for the palliative treatment of advanced cases and as a supplementary measure for prophylaxis before and after operation.

11. Carcinoma of the Bladder and Prostate

(*a*) Bladder.—This is one of the rarer forms of cancer. It occurs in males and females. It often develops in the base of a supposedly benign papilloma.

Symptoms. — Frequency of micturition, bloody urine and tenesmus are symptoms of this condition. Hematuria is always a sufficient indication for examination with the cystoscope.

Differential Diagnosis.—This is made by cystoscope. Tuberculosis, calculus, bilharzia, and blood from renal tumors and calculi must be excluded.

Doubtful Cases.—The precancerous conditions are chiefly polypoid cystitis, benign tumors and calculi.

Standard Operative Treatment.—Transperitoneal operation, with removal of the affected portion of the bladder, is the standard operation for radical cure. Where this is not possible, intravesical operations with the use of the cautery, radium or fulguration may be attempted.

Results.—A considerable number of successful cases of transperitoneal operation have

been recorded. The use of radium by implantation gives promise of success in certain cases.

(*b*) PROSTATE.—Cancer of the prostate is one of the rarer forms of cancer.

Symptoms.—These are not materially different from those of prostatic hypertrophy—i.e., frequency of micturition, loss of power of stream increasing to retention of urine, blood in the urine, tenesmus.

Differential Diagnosis.—This depends on the stony, hard and irregularly nodular feel of the prostate on rectal examination. Positive diagnosis can only be made by microscopic examination of excised prostate. The predisposition of prostatic cancer to extend widely by bone metastasis is a marked characteristic of this disease.

Doubtful Cases.—These should be treated by prostatectomy. Only early cases can be cured by operation. In advanced cases radium may give some relief to symptoms.

Standard Operative Treatment. — The standard operation is prostatectomy—generally by the perineal route, the operation is often supplemented by the insertion of radium tubes in the adjacent tissues of the capsule—post operative X-rays are also used with good effect.

Results.—The radical cure of cancer of the prostate by operation is virtually confined to cases of prostatic hypertrophy in which prostatectomy has been done, and the early changes of carcinoma have been discovered only by the

pathologic examination of the tissue. In certain clinics the treatment of cancer of the prostate by radium is claimed to have yielded satisfactory results, but radium used in conjunction with surgery probably offers more prospect of relief.

12. Carcinoma of the Uterus

This is the commonest form of cancer in the female except carcinoma of the stomach. There are two varieties: (*a*) carcinoma of the cervix, (*b*) carcinoma of the body.

(*a*) Carcinoma of the Cervix.—This is the squamous cell type of carcinoma. It occurs most frequently in women who have borne children; especially when the cervix has been lacerated and the lacerations have been neglected or have become eroded, or subject to constant irritation.

Symptoms.—The earliest symptom is a bloody discharge, not related to catamenia, or appearing after the menopause. Any change in the character of the discharge, especially if it becomes more profuse, more foul, more watery, or more irritating; or if it appears irregularly after exertion, straining at stool, the use of a douche or after intercourse, indicates carcinoma of the cervix.

The appearance of a discharge, even though not bloody, after a period of freedom from discharge, should be regarded as a suspicious symptom.

An examination shows an indurated excoriation or ulceration of the cervix which may be within the os. Later, there may be deep infiltration or a productive cauliflower growth, with ulceration, bleeding and offensive discharge. It extends early to tissues of the broad ligaments and vaginal wall by direct extension, and to the pelvic lymph nodes.

Differential Diagnosis.—The early diagnosis of cancer of the uterus demands a prompt digital and visual examination.

Too often the disinclination of the patient and the indifference of the physician combine to postpone this examination until too late for the cure of the disease.

Early cases can be distinguished from non-malignant ulcerations and lacerations only by microscopic examination.

Doubtful Cases.—Lacerations due to child-birth form the precancerous condition. For this reason all lacerations should be repaired as prophylaxis, at least as soon as the probability of further child-bearing is over. Some surgeons advocate the high amputation of the cervix in suspected cases, while others go so far as to advise an immediate hysterectomy, without the preliminary removal of tissue for pathologic confirmation of the diagnosis.

Standard Operative Treatment.—For established carcinoma of the cervix of the uterus, the standard operation is total hysterectomy with the removal of the pelvic areolar tissues and lymph nodes. This is a very serious opera-

tion, and the results, except in very early cases, have been rather unsatisfactory.

Attempts have been made to combine the preoperative use of radium and the postoperative use of radium, or X-rays, with the standard operation. These methods are still under trial.

The use of radium treatment alone, although employed hitherto chiefly in advanced and inoperable cases, has given such satisfactory results in the more important clinics of this country and abroad, as to justify its further use in more favorable cases. In some clinics, also, the employment of deep X-ray therapy alone is claimed to have produced lasting freedom from symptoms sufficient to be considered a cure of the disease. The subject of treatment of early cancer of the cervix by radiation is under diligent investigation at the present time, and a decision as to its value is eagerly awaited.

For inoperable cases, treatment with radium gives satisfactory palliative results, and in a few instances apparent freedom from disease has been obtained.

The actual cautery is also employed in the treatment of inoperable cases, as well as caustic applications. Such measures, however, are only palliative.

Results.—In advanced cases the results of radical operation for cancer of the cervix are unsatisfactory. In early cases a reasonable percentage of cures has been reported. The disease, when established, is one of the most

unsatisfactory forms of cancer for operative treatment, and the mortality of the radical operation is a serious consideration.

(*b*) CARCINOMA OF THE BODY OF THE UTERUS.—Carcinoma of the fundus is much rarer than carcinoma of the cervix and more insidious. It is usually adenocarcinoma.

Symptoms.—These are discharges of blood or bloody serum independent of catamenia, or after the menopause and enlargement of the uterus.

Differential Diagnosis.—Conditions to be considered in the differential diagnosis are hyperplastic endometritis, polyps, cervical carcinoma, chorio-epithelioma. It may occur in cases of fibromyoma.

Diagnosis is ordinarily determined by curettage and examination of tissue, although some surgeons believe it safer to avoid the chance of setting free cancer cells in the blood and lymph vessels by curettage, and proceed at once to a total hysterectomy.

Doubtful Cases.—These are especially fibromyomas and hypertrophic and other forms of endometritis.

Standard Operative Treatment.—Panhysterectomy with removal of both ovaries and tubes, and the pelvic areolar tissue and neighboring lymph nodes is the standard operative treatment.

Results.—Prognosis for cure by operation is better in cancer of the fundus of the uterus than in cancer of the cervix. If the disease

can be recognized before general extension to the peritoneum has taken place, the radical operation is usually curative; the symptom of hemorrhage makes this early recognition possible. A routine examination of all curettings occasionally reveals an unexpected carcinoma.

13. Carcinoma of the Ovary

This condition is not very rare. It occurs as a secondary manifestation of otherwise non-malignant cysts and cystadenomas of ovarian and parovarian origin, and as a remote metastatic implantation from carcinoma of other organs.

Symptoms.—These are abdominal swelling and feeling of weight or pressure. They are rarely rapid in onset.

Differential Diagnosis.—Early carcinoma of the ovary can be diagnosed only by operation on the supposed benign cyst; late carcinoma, after peritoneal involvement, by bloody ascites and ovarian tumor, or by exploration.

Doubtful Cases.—Exploratory laparotomy should be employed. The precancerous condition is a benign ovarian cyst. All benign ovarian tumors should, if possible, be removed unbroken as papillary intracystic growths already may be present.

Standard Operative Treatment. — Ovariotomy should be done with great care, to avoid rupture of cyst and dissemination of contents. Both ovaries should be removed.

Results.—The radical cure of carcinoma of

the ovary when the cyst is unruptured and when the total removal of both ovaries can be performed, is very probable. It is the diagnosis of the condition which is difficult.

Some cases of ovarian carcinoma of the papillary type are of a low degree of malignancy, and even after laparotomy has disclosed a widespread peritoneal implantation, they may advance very slowly. Under radium and roentgen-ray treatment the progress of the disease may be much retarded.

14. Carcinoma of the Breast

This condition is common in the female; rare in the male.

Symptoms.—The earliest symptoms are those of a tumor which is usually painless. The nipple may be drawn in, or the skin may early show loss of mobility over the tumor, or a definite adherence to it. This is usually the earliest distinctive symptom. Later, the tumor enlarges, the axillary nodes show involvement, extending to the subclavicular, the supraclavicular and the mediastinal glands. Rarely, the enlargement of the axillary nodes is the first noticeable symptom of the disease.

The tumor becomes adherent to the muscles of the chest wall, and may pass by direct extension to the ribs, sternum, mediastinum, or pleural cavity, or to the other breast.

Ulceration may finally occur, or the disease may extend to the liver, spine, cranial cavity,

or the long bones, such as the femur and the humerus. The "brawny arm" of breast cancer is a familiar late symptom, due to the blocking of the veins and lymph vessels by the axillary growth.

Differential Diagnosis.—Conditions to be considered are benign tumors of the breast—adenofibroma, papillary cystadenoma, and other rare tumors—cystic disease of the breast, and chronic inflammatory processes, such as syphilis, tuberculosis, or chronic abscess following lactation. The most significant facts in the diagnosis are the *absence of pain,* and the early adherence of the skin to the tumor.

A lump in the breast of any woman, over the age of 35 years, must be suspected to be cancer until pathological proof of some other disease is obtained.

Breast cancer is not unknown in much younger women, so that it may safely be said that any lump in the breast of a woman over 20 years of age should be considered as possibly cancer.

Precancerous Conditions. — As age advances, practically every one of the supposedly benign tumors and diseases of the breast shows an increasing predisposition to malignant disease. Especially is this true of chronic cystic growths, such as papillary cystadenoma. Even the adenofibromas of adolescence occasionally show subsequent malignant characteristics, either as carcinoma or sarcoma. In any case, benign breast tumors and diseases are

best cured by operation, if the patient is over 30 years of age.

Doubtful Cases.—Cutting into normal tissue to remove a suspicious nodule in the breast, and closing the wound to wait a week or ten days for a microscopic report, has been found to spread the disease and to make cure improbable by subsequent radical operation, if cancer is found to be present. For this reason the handling of doubtful cases is very difficult in diseases of the breast.

The best procedure in a doubtful case is as follows:

(*a*) Incision directly into the tumor, with the removal of tissue for frozen section diagnosis, if necessary, to be followed *immediately* by cauterization of the wound, and by the performance of the complete operation, if cancer is discovered. This method of procedure is applicable only where a sufficient knowledge of gross pathology, or the facilities for an immediate frozen section diagnosis are available. It is recommended then only in cases where, from the clinical symptoms, the probabilities are against, rather than in favor, of the diagnosis of cancer, as in the case of women under 30 years of age.

(*b*) In women of more advanced years, where the symptoms are suggestive of cancer, if facilities for an immediate diagnosis are not available, the safest procedure is to perform the radical operation at once, without incision into the cancer tissue.

Standard Operative Treatment. — The standard "complete" operation for cancer of the breast demands the removal *in one piece* of the whole breast, with the skin over it, the pectoralis major and minor, and the axillary contents, with the exception of the axillary artery and vein, and the brachial plexus. Some surgeons advise the supraclavicular dissection also. The incisions for this operation vary, and the defect to be closed is always large. If the skin cannot be brought together by plastic flaps, a Thiersch graft may be necessary.

Radio-therapy.—While the treatment of operable cancer of the breast by radiation alone is not considered adequate, the use of pre-operative and postoperative radiation, usually by X-rays, is coming to be generally practiced. The extent of the field of operation in these cases makes X-rays of more value than radium.

Results. — In favorable cases, with early operation, a considerable percentage of cures may be expected. The average case that comes to a general hospital, however, has only a moderate chance of cure.

15. Carcinoma of the Penis

This is rare. It is associated with chronic irritation, such as venereal warts or phimosis.

Symptoms.—These are a papillary or ulcerated indurated tumor, and early extension to the lymph nodes of either groin, or of both.

Standard Operative Treatment. — The standard operative treatment is amputation of

the penis, and dissection of both groins. For prophylaxis, circumcision, cleanliness and treatment of venereal warts and sores should be employed.

Results.—Early radical and complete operation gives a good prospect for cure.

16. Carcinoma of the Vulva

This is the squamous cell type of carcinoma. It is rare and almost entirely limited to women beyond the menopause.

Symptoms.—These are pronounced itching, often for several years before the ulcer appears, and moderate bloody discharge. In some instances there is pain on urination and early glandular involvement of the inguinal and femoral lymphatics.

Precancerous Conditions.—These are "kraurosis" or leukoplakia of the vulva. Their treatment by radiation may be advisable.

Differential Diagnosis.—Syphilitic ulceration, chancroid, erosions from prolapse, and polyp of urethra are to be considered.

Standard Operative Treatment.—Radical operation with removal of the vulva, together with all of the deep and superficial inguinal and femoral lymph glands on both sides, is the standard operative treatment. Radium and X-rays have been used in cases of this character and are preferred in certain clinics.

Results.—Only with early cases and prompt treatment is the prognosis even moderately good.

V

SARCOMA

Sarcoma is a malignant tumor of connective tissue origin. Various types of rapidly growing connective tissue cells may occur, such as large and small round cells, spindle cells, giant cells, pigment cells, cells of the mucoid type found in the umbilical cord, lymphoid cells and mixtures of all of these different types.

Sarcoma may arise primarily in any tissue of mesenchymal origin, but, in general, the subcutaneous and submucous tissues, the fasciae, the bones and lymph nodes, are the more common points of origin.

Sarcoma attacks persons at all times of life, from infancy to old age.

It grows, as a rule, with great rapidity, as it is abundantly supplied with blood vessels. It infiltrates surrounding tissues, and through the blood vessels more than through the lymphatics, spreads to distant parts.

So far as known there are no presarcomatous conditions, although trauma is believed by many writers to have significance in the etiology of bone sarcoma.

It is not known what causes sarcoma and nothing can be done to prevent its occurrence.

1. Sarcoma of the Bones

There are two main varieties: (*a*) spindle cell, or osteogenic sarcoma; (*b*) giant cell, or

medullary sarcoma, and a number of rarer and more atypical forms have also been described.

(*a*) Spindle cell, or osteogenic sarcoma, is a tumor of extreme malignancy. Its onset is insidious; its growth is rapid. Obscure pain, or impaired function of a limb is followed by the swelling of the bone. Rarely, a spontaneous fracture is the first definite symptom.

Extension to the viscera, the lungs, the liver and other organs may take place at any time.

The diagnosis depends on the roentgen ray picture, which is unmistakable in well-advanced cases, but may be only suggestive in early and favorable tumors. Only those especially trained are capable of interpreting these radiographs. Many cases of early osetogenic sarcoma are treated for sprains, rheumatism, osteomyelitis and other bone diseases before X-ray photographs are secured and the diagnosis established.

Treatment is by early and radical operation —amputation. The results are very discouraging, on account of internal metastases. Treatment of inoperable or recurrent cases by radium or roentgen rays yield unsatisfactory results.

(*b*) Medullary sarcoma arises in the bone-marrow, and produces a distension and thinning of the cortex of the bone such that spontaneous fracture is common. The onset is insidious, and the symptoms vague. A radiograph is suggestive, but not always to be relied on with certainty to exclude bone cysts and

other benign lesions, especially in young persons.

The tumor contains giant cells as well as large and small round cells. Its malignancy is much less than the periosteal type. Extension is not so rapid and internal metastases are rarely found. Local excision, incision and curettage, radium or even external radiation by X-rays have been sufficient to cure, in certain cases. Amputation may be necessary on account of the extent of the tumor and the impossibility of saving the vessels and nerves to the distal part.

The prognosis is much better than with periosteal sarcoma, although internal metastases have been reported in rare cases.

2. Fascial Sarcoma

The great majority of the tumors of the soft tissues of the limbs and trunk are of neurogenic origin; but some appear to arise from the intermuscular tissues, and these are called fascial sarcomas.

The tumors lie deeply between the muscles, and often close to the bone. They may be distinguished from osteogenic sarcoma by the radiograph which shows bone and periosteum intact. They grow rather rapidly and may reach large dimensions, causing a bulky, diffuse swelling of the limb. The muscles are displaced and eventually invaded. While at first circumscribed, they soon infiltrate the surrounding tissues and even the skin. Pul-

monary metastases occur in the late stages. Penetrating widely between muscles, they are difficult to extirpate.

Structure.—The fascial sarcomas are soft cellular tumors composed of many small spindle cells, very many small capillary blood vessels, and much stroma which is usually myxomatous.

Treatment. — Complete surgical removal may be successful with the smaller circumscribed tumors, but recurrence is the rule, and amputation of the limb may be required. The soft vascular tumors are quite susceptible to radiation, which should be employed before amputation or other extensive operation is resorted to.

3. Neurosarcoma

These comparatively common tumors constitute the great majority of the fibrous and sarcomatous growths of the skin and subcutaneous tissues. A true fibroma or sarcoma of the skin or subcutaneous tissues, apart from these neurogenic growths, is extremely rare.

Two main clinical varieties of these tumors are observed.

(1) *Multiple neurofibromatosis of the skin (Recklinghausen's disease).* In this disease the skin is the seat of many small, nodular slowly-growing tumors located in the derma. There is often a slight, diffuse pigmentation of the skin, and a general neuropathic tendency is sometimes observed.

The tumors are generally of the size of a pea or bean. Occasionally they are larger and rarely they grow to considerable size and become pedunculated.

The course of the disease is chronic, and there is no effective treatment, since the nodules are usually too numerous for excision. About 8 per cent. of the cases of neurofibromatosis are eventually complicated by the development of larger and more or less malignant tumors of the subcutaneous and deeper nerve trunks, and belong in the second group.

(2) *Neurofibroma or neurosarcoma of the deeper nerve trunks.* In this condition the tumors arise in the subcutaneous or deeper nerve trunks, between the muscular planes, or in the serous cavities, or in the pelvis.

These tumors are large and grow rapidly. At first they are movable beneath the skin or between the muscles. Later, they infiltrate skin, fasciae and muscle, and extend along the nerve trunk, where also, new tumors arise. In the so-called plexiform neurofibroma, a whole nerve trunk may be the seat of numerous globular tumors.

Neurofibromas are not encapsulated although at first more or less circumscribed. Hence they are difficult to extirpate completely.

Nearly all these tumors tend to recur locally after excision, each recurrence becoming more cellular and malignant, and requiring wider excision. Eventually amputation is necessary;

but in a high proportion of cases the disease proves fatal from persistent recurrences or pulmonary metastases.

The unfortunate results that so often follow the simple excision of these apparently innocent tumors call for much greater care than is usually employed in their treatment.

Structure.—The structure presents characteristic intertwining bundles of spindle cells and fibrils derived from the nerve filaments. In the more benign types axis cylinder processes may be demonstrated by appropriate staining (Neuroma). In most cases only the bundles of spindle cells are observed and the usual diagnosis is spindle cell sarcoma, or fibroma, or fibrosarcoma. Many of the larger growths are cellular, and myxomatous.

It is difficult to determine from the structure just what grade of malignancy exists, but all the subcutaneous and deeper tumors must be treated as potentially malignant.

Treatment.—Careful and complete dissection of the tumor is probably the best treatment, and, in a certain proportion of cases, it is successful. Yet recurrences are so frequent that many prefer to give a thorough preliminary radiation before excision, and to follow with postoperative radiation. The tumors are quite resistant to radiation alone, but occasionally they become absorbed after prolonged treatment.

The recurrent tumors present a very difficult problem, and amputation should not be

too long delayed, especially if the tumor is cellular.

4. Lymphosarcoma

A number of tumors, or of diseases lying close to the border line between tumors and inflammatory diseases, occur in the lymph nodes. Among these conditions two are of special interest: (*a*) malignant lymphoma; (*b*) lymphosarcoma.

(*a*) *Malignant lymphoma* (Hodgkin's disease). This is a disease, the nature of which is still under investigation. It starts with the enlargement of one or more lymph nodes, and progresses to a disease of practically the whole lymphoid apparatus, with infiltration, invasion, and even visceral manifestations similar to metastases. Some authorities believe it an infectious process, a granuloma; some believe it a new growth. It is possible that both are correct and that it starts as the result of an infectious or toxic agent and progresses to the character of a malignant tumor. The disease is not uncommon.

Symptoms.—The lymph nodes of one region, usually the cervical nodes, enlarge. The disease rapidly extends to other groups of lymph nodes and to the visceral lymphoid tissue. Death is finally caused by mechanical obstruction to one or another vital function, generally to respiration.

The diagnosis is established by the removal of one or more of the affected lymph nodes,

disclosing a tissue histologically typical of the disease.

Differential Diagnosis.—Tuberculosis lymphadenitis must be excluded by the removal of a gland for microscopic examination, if necessary. Leukemic enlargement of lymph nodes is recognized by the differential blood examination. The blood picture of Hodgkin's disease is characteristic in many cases, but this is not always to be depended upon.

Treatment.—Radical surgical treatment is advocated by a few authorities. Vaccine treatment has been tried, without much success. At the present day the usual treatment is by Roentgen rays or radium. Even under this treatment the relief afforded is usually but temporary, although life may be made far more comfortable and may be notably prolonged by it.

(*b*) *Lymphosarcoma.*—This is a malignant tumor, made up of large round lymphoid cells. It occurs in several situations, notably the tonsils. It is of unicentric origin; from its starting point it invades the adjacent tissues, either directly into surrounding muscles and fasciae or systemically into regional lymph nodes and lymphadenoid tissue. Such tumors are rare.

They extend rapidly to the adjacent lymph nodes as well as through the blood vessels by metastases to the viscera. They are extremely malignant tumors, and are rarely cured, even by the most extensive surgical operations.

They are often favorably affected by radiation for a period of time, but this can usually be considered only a form of palliative treatment—operative treatment, even only a biopsy, frequently leads to rapid dissemination of the disease.

5. Melanosarcoma

One of the rarer, but one of the most malignant forms of sarcoma is that composed of cells similar to the pigmented cells of the rete mucosum—melanotic sarcoma. Such tumors occur also in the retina, choroid, and other situations where pigment-bearing cells are found.

It is because of the occurrence of melanosarcoma in pigmented moles that the universal rule for the removal of such moles is promulgated.

Melanosarcoma, in its invasive characteristics and in its extension to adjacent lymph nodes, resembles carcinoma rather than sarcoma, and some, indeed, believe that its cells are of epithelial origin. In any case, it is one of the most rapidly growing and one of the most malignant tumors with which we have to deal. When extension has occurred to adjacent lymph nodes, a cure is rarely obtained, even by the most radical operation. The liver is early involved.

The disease must be prevented by the removal of pigmented moles by excision, before they have undergone this malignant change,

or, at least, by their radical removal together with the regional lymph nodes, on the slightest sign of induration, ulceration, or on any disposition to increase in size.

Advanced cases of melanotic sarcoma are not controlled by radiation.

VI

OTHER MALIGNANT TUMORS

1. Myeloma

Myeloma is a term applied to a group of tumors which arise from the cells of the bone marrow. Some are local in origin, rapidly growing, productive of wide metastases, and usually fatal, while others are multicentric in origin, or arise over a wide area of the marrow system and progress more slowly, but are also regularly fatal.

Symptoms.—The onset is obscure, with attacks of pain and tenderness over the affected bone. The pain is dull and aching and the disease is usually mistaken for rheumatism, lumbago, neuralgia, or osteomyelitis. It is usually so treated until it has advanced to a serious stage.

Local enlargement of the bone and soft tissues soon appears and progresses slowly and steadily. Anemia is usually present and may be severe. Invasion of the lymph nodes occurs in some cases and serves to distinguish the disease from malignant tumors of the bone. Bence-Jones protein occurs in the urine in many, but not in all, cases. Kahler's disease is a form of multiple myeloma in which many bones, especially the skull, ribs, and vertebrae,

are affected by very many small, perforating tumors.

Diagnosis.—The main diagnostic feature of myeloma is bone absorption, as disclosed by the X-ray. The tumor generally affects wide areas of the shafts of the long bones, and not the ends of the epiphyses as does osteogenic sarcoma, or the epiphyses as does the giant cell tumor. It causes a gradual fading and widening of the shaft, displacing the remaining layers of the shaft outward; but it never produces bone. It does not produce a multicystic, central cavity, as does the giant cell tumor, nor the radiating striae of bone, as seen in many osteogenic sarcomas.

Advanced localized myelomas are often mistaken for syphilis.

Treatment.—The first step in the treatment of myeloma should be thorough radiation by the X-ray. The respnose is usually so prompt and the regression of the tumor is so marked that the result may stand as of diagnostic significance, since no other bone tumor responds in this manner. In a few instances the regression has apparently been complete, but recurrences are prone to develop in a few months. Subsequent radiation may be less effective and metastases may develop. It is probably the safest course to amputate the limb as soon as any return of the disease is apparent. Owing to the danger of metastases, some would prefer to amputate at the begin-

ning, but the results of operative treatment alone are very unsatisfactory.

For the multiple forms of the disease, radiation offers only temporary relief.

2. Endothelioma

There are several well recognized forms of endothelioma, and many ill-defined varieties.

(*a*) Endothelioma of the dura mater is a well known brain tumor. It is usually single, sometimes multiple, develops along the base or over the convexity of the brain, or along the spinal meninges. It grows slowly, may reach considerable size after years, and gradually produces localizable pressure symptoms. The active course and sudden exacerbation of symptoms of glioma are missing.

It is the most favorable of all brain tumors for radical removal by operation.

(*b*) Endothelioma of lymph nodes is found as the lesion in a moderate number of cases of chronically enlarged lymph nodes. The disease usually affects the cervical nodes, extending slowly to the opposite side, or to the axilla. Occasionally the lesions are very widespread. The progress is relatively slow, resembling Hodgkin's disease. The nodes are very hard, as in carcinoma, but the advance is much less rapid.

The diagnosis by microscopic section is often difficult and requires experience. The structure resembles carcinoma, or some form of

sarcoma, but a primary carcinoma of the adjoining mucous membrane cannot be detected and the cells are not the round cells of lymphosarcoma of any type. It is probable that the tumor arises from the lining cells of the sinuses or the reticulum cells of the lymph nodes. The disease is sometimes preceded by, or associated with tuberculosis.

Combined treatment by radiation and excision is indicated. The prognosis is poor, but better than with secondary carcinoma.

(*c*) Endothelioma of serous membranes affects the pleura, peritoneum, and, rarely, the joint synovia. It produces multiple, nodular or vesicular elevations which increase in size, fuse, form broad thickenings of the affected membrane and invade the supporting connective tissues, but rarely produce metastases.

The progress is slow, and is accompanied by serous effusions, adhesions and interference with respiration (pleura), or intestinal functions (peritoneum).

Radiation may be employed as a palliative.

3. Glioma

Glioma is the specific cellular tumor of the central nervous system, arising at all ages and at any point in brain or cord, and forming more than one half of all brain tumors.

Symptoms.—A glioma usually replaces a considerable portion of brain tissue, causing symptoms from general cerebral pressure and

from focal destruction of nerve tracts and centers. General pressure symptoms are severe headache, vomiting, slow pulse and choked disk, with amblyopia or amaurosis. Focal symptoms depend on the location of the tumor. The location can often be determined accurately by expert examination.

The course is usually progressive and fatal within an average of ten months. Gliomas do not produce bulky tumors, but replace a portion of the brain by soft vascular tumor tissue or a more solid, opaque tumor mass which is poorly defined. A peculiar feature is the tendency to sudden hemorrhage into the tumor tissue, which may cause attacks suggestive of apoplexy.

The gliomas generally recur locally, but they do not produce metastases. The structure presents variable proportions of ganglion cells and nerve fibers, most of the cells being small and round.

Treatment.—The surgical treatment of glioma, involving craniotomy, is very unsatisfactory; but most cases deserve an exploratory operation on the supposition that the growth may be localized or that some less malignant tumor may be found.

The prognosis is grave on account of the invasive character of the tumor, and the difficulty of complete removal. A decompression can be performed as a palliative measure.

4. Neurocytoma

Neurocytoma is a cellular tumor derived from nerve cells. It may originate from embryonic or adult nerve cells.

Two groups of these rare tumors are recognized—those arising in the central nervous system (neuroepithelioma) and those outside the central nervous system in the distribution of the sympathetic nervous system (sympathetic neurocytoma).

Both tumors are chiefly of pathologic interest on account of the identification of typical, neuroblastic formations of cells in rosettes or with the characteristic neurofibrils of the peripheral nerve system.

They are both extremely malignant. Their symptoms are not characteristic, and operative treatment rarely succeeds in accomplishing their complete removal. Since they usually occur in young subjects and are often embryonal, they deserve thorough treatment by radiation, if not operable.

5. Hypernephroma

Although hypernephroma is the commonest tumor of the kidney, it is, nevertheless, a rare disease.

Most hypernephromas arise from the renal tissue, a few from misplaced adrenal rests in the kidney or other organs, and some from the adrenal itself. They exhibit all grades of malignancy, some being benign adenomas,

some adenocarcinomas, and others highly malignant carcinomas. The cells are large and clear, and resemble endothelium.

The malignant tumors are very vascular, grow rapidly, and produce bulky tumors in a few months. They often invade the renal vein and vena cava and produce local peritoneal extensions and general metastases in liver, lungs, bones and brain. Bulky destructive bone metastases are characteristic, and often appear before the primary tumor is suspected.

Symptoms.—Local pain, a tumor in the region of the kidney, and hematuria are the chief diagnostic signs. Roentgen rays examinations of the long bones are necessary to exclude the possible consequences of metastases.

Treatment.—The treatment is immediate extirpation of tumor and kidney, but it is successful only in the early stages of comparatively benign tumors. The first step in the radical operation should be the ligature of the renal veins to prevent dislodging tumor emboli into the general circulation.

6. Adamantinoma

Adamantinoma is a tumor arising from the enamel organ of the developing tooth. It is therefore located within the jaw bone, but may first be noted as a projecting tumor of the alveolar border.

It is by no means uncommon, and is usually treated as an inflammatory process about the

teeth until it has reached serious dimensions. From the beginning the affected ramus of the jaw is swollen, and the adjoining teeth are usually protruded. They may be extracted without any good effect. Invasion of the lymph nodes is very late and occurs only in recurrent cases.

The general progress is slow, and recurrence after operation may be delayed many years. The disease is very fatal and requires aggressive surgical measures at the beginning, at which time the prognosis from operation should be good.

Diagnosis.—The diagnosis may nearly always be made early by the radiograph, which shows a deep seated, often multicystic, absorption of the ramus of the jaw. The bone is not invaded, as by carcinoma, but absorbed by pressure, and the multiple cysts, developing laterally, may extend over a much larger area than is suspected by ordinary examination. Hence recurrences develop after apparently radical excision of a segment of the jaw.

The structure varies with the point of origin of the tumor. It may arise from the gubernaculum dentes, a strand of gingival epithelium which leads from the epithelium of the gum to the deep enamel organ. In this case the tumor may be more superficial and resemble squamous carcinoma, but there are always areas of tumor cells which are widely reticulated or basket-shaped, as in the enamel organ. Or the tumor may develop from the adult enamel organ, in which case it reproduces

the structure of this organ, as an adenoma or adenocarcinoma.

Treatment.—The treatment is complete removal of all that portion of the jaw bone which the radiograph shows to be involved.

7. Chorioma

Chorioma, or chorionic epithelioma, is a highly malignant tumor of the uterus which occurs chiefly after hydatid mole (44 per cent.); after abortion (30 per cent.) and after normal labor (22 per cent.).

It occurs so frequently at a period of from five to eight weeks after hydatid mole that all such cases should be watched for the development of a malignant tumor. All moles should be carefully examined in the gross and microscopically for malignant changes. Adherent moles or placentas and multiple pregnancies, especially, predispose to chorioma.

Symptoms.—The chief symptom is repeated bleeding from the uterus, which may or may not be enlarged. The bleeding usually begins in the third month of supposed pregnancy. Bluish vaginal metastases have often been the first sign detected.

The diagnosis is to be made from the curettings, showing the characteristic two types of cells of syncytial and Langhans layers.

The prognosis is always unfavorable, but when villi are preserved in the tumor (destructive placental polyp) not a few cases have recovered.

The association of chorioma with large corpus luteum cysts is thought to be of significance in the origin of these tumors, and it is believed by certain writers that it is in response to the excessive internal secretion of these lutein cysts that the syncytial cells take on the enhanced invasive growth which leads them to perforate into the blood vessels and produce remote metastases.

Treatment.—The treatment is hysterectomy.

8. Mixed Tumors

Several well known varieties of tumors are composed of more than one tissue which participates in the tumor process, and sometimes these several tissues appear to be derived from more than one embryonal germinal layer. Such growths are properly designated as mixed tumors.

Two separate processes are probably involved in the growth of these tumors.

(*a*) The tumor arises from two entirely different, but contiguous, tissue rests which were isolated during the development of the organ, and remained in a more or less embryonal state. Examples of this group are the fibroadenoma of the breast, which is a benign, and usually adult, type of tumor, and the Wilms' tumor of the kidney which is always embryonal and malignant.

(*b*) The tumor arises from a single tissue or cell group but develops, by metaplasia, an en-

tirely different tissue in parts of the growth from that which it should normally show.

An example of this group is the mixed tumor of the salivary glands.

WILMS' TUMOR OF THE KIDNEY.—Adeno-myo-carcino-sarcoma—is an embryonal tumor of the kidney.

This tumor arises almost exclusively in children, and usually in about the third or fourth year of life. Less embryonal forms, reproducing mainly renal structures, occur in older subjects.

The tumor grows rapidly, and soon declares itself as a bulky, abdominal mass. The patient rapidly develops anemia and cachexia. The tumors are often multicystic, which accounts for much of their size, and they are subject to hemorrhage with collapse of the patient.

The structure presents varying proportions of very cellular tissue, composed of spindle cells, spaces lined by cuboidal epithelial cells, occasionally smooth and striated muscle cells, and numerous blood vessels.

Treatment.—Surgical removal at the earliest moment is indicated, but is rarely successful. Radiation may be employed with caution, owing to the tendency to hemorrhage by the breaking down of the tumor tissue.

MIXED TUMORS OF THE SALIVARY GLANDS.—These are well known and relatively common tumors, occurring at all ages, except infancy, and affecting chiefly the parotid, though sometimes the submaxillary, gland.

The tumor produces a firm mass which is at first encapsulated, but eventually tends to invade the gland tissue. The growth is slow, generally painless, but progressive.

Long periods of intermission of growth have been observed. When such cartilage is produced the tumor is very firm and lobulated. Invasion of lymph nodes is very late.

Structure.—The structure presents variable proportions of small, compact epithelial cells of the type of basal cell epithelioma, areas of spindle cells derived from the epithelium, and often islands of hyaline cartilage, which are probably also derived from the epithelium. The general clinical course is that of basal cell epithelioma.

The treatment generally employed is radical excision of the tumor mass, in advanced cases including the entire salivary gland. It is successful in about 30 per cent. of the cases. Recurrences are successfully removed in a smaller proportion of cases.

Satisfactory results from radiation are reported from several sources. This seems reasonable in view of the relation of the tumor to the basal cell epitheliomas.

9. Teratoma

Teratoma is a tumor which develops from a cell, or group of cells, which have all the growth potencies of the ovum. They usually present derivatives of all three germ

layers, and sometimes develop several of the organs and structures of a fetus.

Two main theories are adduced to account for the origin of teratomas.

(*a*) The tumors develop from a sex cell, comparable to the ovum, which has become misplaced and disturbed in its development. Hence teratomas are most common in the ovary and testis.

(*b*) The tumors develop by a form of budding from the very early embryo, the bud including portions of all three germ layers, or occurring before there is any differentiation of the germ layers.

It is probable that both theories apply to different teratomas.

Teratomas are of two structural types, (*a*) adult, and (*b*) embryonal.

(*a*) The best example of the adult teratoma is the ovarian dermoid, which contains well formed skin and its appendages, cartilage and bone, teeth, intestinal tract, nervous system, etc. These tissues are usually adult in type and free from any signs of a true neoplasm, but malignant changes may occur in any one of these tissues or in the adjoining ovarian tissue. True dermoids occur in many situations, as in pharynx, mediastinum, abdomen, and testis.

(*b*) The embryonal teratoma occurs most frequently in the testis, where it takes a considerable variety of forms, most of which are malignant.

It is characteristic of the embryonal teratoma that one germ layer, or one tissue, gains the upper hand and suppresses the growth of all the others. In this way comparatively simple and malignant or benign tumors may develop from a teratoma.

In the testis the commonest form is the so-called "round cell sarcoma." This is really an embryonal carcinoma derived from intestinal, respiratory, or neural epithelium. It is a soft, rapidly growing, very malignant tumor, first appearing, not in the body of the testis, but in the rete testis. It occurs mainly in young adults, producing metastases in the inguinal and especially in the retroabdominal nodes about the coeliac axis.

In "hydatid disease" (Curling) the testicular tumor is very firm, grows more slowly, and is composed of many islands of cartilage and of cysts lined by squamous epithelium. It also is malignant, owing to the presence of adenocarcinomatous portions derived from various glands of the embryo.

Testicular teratoma is nearly always fatal, especially the carcinomatous forms. The prognosis of the cartilaginous tumors with very early extirpation is rather better. The testicular teratomas and others are generally very susceptible to radiation, which may be employed as a preliminary to extirpation, and to restrain the metastases.

Somewhat similar tumors occur in the ovary.

VII

TREATMENT OF INOPERABLE OR RECURRENT CANCER

MUCH may be done to relieve the patient with recurrent cancer. Not only can life be prolonged, but it can be made much more comfortable by palliative treatment. The more important methods of treatment are as follows:

1. *Radiation.*—As a palliative in the treatment of advanced cancer, radium and X-rays are of great value. The use of these agents has now developed into an extensive branch of therapeutics. Standard methods and dosages have not yet been established. The treatment of each case generally depends on the equipment and personal experience of the radiologist. Certain general principles, however, may be stated.

The radiation treatment of advanced cancer should be most carefully planned and controlled, otherwise it may do more harm than good. The attempt to destroy advanced lesions in mammary and squamous carcinoma, whether deep or superficial, generally ends in failure and in the production of radiation cachexia from injury to vital organs. It is usually better to attempt only to restrain the growth and prolong the life of the patient.

The result to be expected in the radiation of

advanced cancer depends much upon the type of the tumor. Squamous and glandular cancers are very resistant, while embryonal and lymphoid tumors often respond to a remarkable degree. Considerable experience is necessary in order to decide what result may reasonably be expected and what amount of radiation may safely be given.

Two different views are held by radiologists regarding the best method of dealing with advanced cancer. Some prefer to deliver a single large dose with the hope of getting the desired effect at once, while others prefer to give repeated, small applications over a long period. No invariable rule can be employed. The latter method is generally the safer, and recent reports rather favor its employment in the majority of cases.

Radiation in advanced cases often gives much relief by alleviating pain, reducing discharges, and relaxing strictures of important organs.

It is a universal experience that the result of radiation in advanced cancer is closely dependent on the general resistance and strength of the patient. Very cachectic patients seldom experience any definite benefit, and many of them are made worse by aggressive measures.

2. *Palliative Operations.*—Palliative operations are often indicated in cases of recurrent cancer to relieve the patient of an offensive sloughing tumor, or merely for the relief of pain or of other mechanical symptoms.

In such cases the cautery can often be employed to advantage for the control of hemorrhage, and to increase the destruction of tumor tissue without dissemination. Operations of this nature are often advisable in recurrent cancer of the cervix and of the breast.

In cancer of the pharynx or larynx, tracheotomy is often an operation of necessity, and in incurable cases of cancer of the stomach or intestine, where obstruction exists, a palliative gastro-enterostomy or an intestinal anastomosis may relieve the patient's most distressing symptoms.

Colostomy gives relief to much of the distress in cancer of the rectum, and a suprapubic drainage gives relative comfort in cases of advanced cancer of the bladder and prostate.

In many cases of advanced cancer about the face, a combination of operation, cautery, and radium or roentgen ray treatment may yield results quite unattainable by any one method used alone. It should again be pointed out that preoperative and postoperative radiation are proving efficacious in preparing cases for operation and in preventing recurrence.

Finally, even so severe an operation as an amputation at the shoulder joint may be performed for the "brawny arm" of recurrent cancer of the breast, to relieve the patient of an intolerable burden.

3. *Symptomatic Treatment.*—Symptomatic treatment of recurrent cases of cancer yields

results in the way of relief of suffering which have not always been appreciated.

Opiates are indicated as surely in hopeless cases of cancer as in any other condition with which the physician has to deal. Their use, however, should be guarded, and should be supplemented with other sedatives in order to delay the necessary increase of dosage.

Where the pain of nerve pressure exists, as in spinal metastases or tumor infiltration of the brachial or lumbar plexus, special operations for the division of sensory nerves or spinal nerve tracts may be advisable, although such measures are not widely practiced.

Finally, the nurse can contribute quite as much to the comfort of the advanced case of recurrent cancer as can the physician. Frequent and gentle dressing of ulcerated surfaces to diminish discharges, relieve offensive odors and prevent distressing infections do much to make the patient's condition bearable, while the maintenance of a comfortable position, the avoidance of pressure sores, the occupation of the mind of the patient, and the maintenance of nutrition by carefully selected nourishment, as well as a cheerful spirit on the part of the nurse herself, all help materially to alleviate distress.

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